The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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The "Unqualified" Chemist

THE young man who enters a chemical laboratory straight from school has long been a fruitful subject for debate among qualified chemists who have to direct the activities of these slightly trained or untrained youths. It is useless to declare that such entrants should not be admitted to the chemical profession, and that all should be fully trained in the academic sense before being employed in a laboratory. The vast majority of routine analytical work is to-day carried out by an army of semi-skilled juniors and a place must be found for these juniors in the profession even if it may be in the outcome that that place is no higher than that of the nurse-probationer in the medical profession. Moreover, as Mr. McLachlan recently pointed out (*see* THE CHEMICAL AGE, September 27, p. 174), some "unqualified" chemists are chemists by nature.

Dr. A. E. Rudge has pertinently discussed this subject in the current issue of the *Chemical Practitioner*, as the problem is likely to become of increasing importance. The ideal training for a professional man—and we say this without hesitation whether anyone likes it or not—is that he shall have studied Classics in his youth, and that he shall have taken up chemistry only after reaching at least matriculation standard in the Humanities. That this has been recognised by a kindred profession is instanced in a recent paper by Mr. John Terrace, honorary secretary of the Institution of Gas Engineers. One effect of this war and of the crushing burden of taxation which the professional classes of this country—and of no other—are called upon to bear must inevitably be a reduction in the standard of education because those who were formerly the backbone of the country and who educated their sons for the professions will no longer be able to afford to do so. Unless we are to fall into the same pit as Germany and "liquidate" the more intelligent section of the population, industry must adopt means for training its own employees.

Dr. Rudge has pointed out that the part-time student-employee presents one of the greatest problems in the organisation of the chemical profession because, since there is such an entire lack of vocational standards of employment and so complete a dissociation of educational systems, there is a bewildering variety of types and grades in its recruits. In Dr. Rudge's view the present system of recruitment is unsatisfactory. He believes that education and industry are both to blame for this because neither shows a sufficient appreciation of the scope and potentialities of the other. He maintains that we must overhaul and standardise the whole process of recruitment and not allow such haphazard systems to develop further, and that the first step towards stabilising the chemical profession lies in the direction of evolving a logical scheme of vocational training as so many other professions have done. A suggested scheme would involve recognition of some basic standard of general education such as matriculation or its equivalent, followed by a recognised course of special training; this may well be a one-year full-time course in Industrial Chemistry and Analytical Practice set to a nationally accepted standard. Pupils satisfying these pre-employment conditions would constitute the rank and file of registered students, and would continue with subsequent part-time studies towards graduation as junior members of the profession. Education authorities should be called upon to inaugurate suitable vocational courses in the technical colleges, and to ensure an adequate transfer of pupils from the secondary schools.

We cannot tell what shape education will take in post-war Britain. It seems inevitable to many that the State must subsidise education as it is subsidising so many other things. Higher education, however, may be one of the branches of the national life for which there will not be enough money. Industry creates the national income. Consequently, industry must have the best brains of the country and we must see that those brains are properly trained. Dr. Rudge rightly suggests that possession of a School Certificate is no criterion of the suitability of an individual to become a chemist. There should be first the desire to enter the profession, and secondly a satisfactory report from the National Institute of Industrial Psychology or from the boy's school, indicating a general aptitude. After that the employer must himself weed out those among the entrants who are likely to be of value, after a probationary period. The basic problem of training the entrant then remains. This, in our view, involves part-time studies (as suggested by Dr. Rudge) conducted in the daytime and at the expense of the employer, the employee's wage being increased in these early years in accordance with his progress. These young men must be given every opportunity to qualify for the higher ranks of the profession by taking a degree or the examinations of the Institute of Chemistry. Nothing in this discussion is intended to suggest dissent from the view that the proper course for an entrant to the chemical profession is to take a degree in chemistry at a university; but as in the past so to a much greater extent in the future, chemists will be found in the higher ranks of the profession who have worked their way up without passing through a university.

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NOTES AND COMMENTS

Production Management and its Critics

THERE is quite a considerable stir in the lay Press to-day about the alleged inefficiency in government-run factories; and rightly so; for there can be little doubt that too many of the allegations of inefficiency have more than a grain of truth in them. This is, indeed, not to be wondered at, considering the way in which our factories have had to turn over from peace-time to war-time conditions; the surprising thing is that a proportion of the factories are actually quite well run. Such factories, however, do not make news and can be left to carry on. Meanwhile public attention is justly directed towards the delinquents; and there is one thing that public opinion will not stand, and that is the victimisation of those who call attention to inefficiency. The case of Mr. John Clark, the chemist who was recently dismissed from a Royal Ordnance factory on unspecified grounds of inefficiency, was mentioned in our last issue. Mr. Clark had been public-spirited enough to make a nuisance of himself by criticising the management of his factory in the public Press and by writing letters to M.P.'s on the subject. It is a remarkable coincidence that he was thereafter found suddenly to be so inefficient that he had to be dismissed, neck and crop; actually, as Mr. Clark pointed out in an interview with THE CHEMICAL AGE, it is doubtful whether the dismissal is legal, as the permission of the National Service Officer was not previously obtained. At all events the intention was to dismiss him, and if the reason was purely the fact that he had levelled criticism (and quite mild criticism at that) against the management, their action is not to be tolerated. It is a healthy sign that the question is to be raised in Parliament, and that some cases of glaring mismanagement have already been dealt with.

A Fair Reward for Responsibility

VARIOUS reasons have been assigned for lack of efficiency in war-time factory management, when it occurs. The "capitalists," of course, come in for their share of the blame; the Trades Union Congress has been cited, on account of its wage policy; and lack of practical knowledge in the controlling Government departments has likewise been suggested as a cause. In our view there is yet another factor affecting the situation, at any rate in Government-controlled establishments. This is that the reward offered by the Treasury in the shape of salaries for highly-responsible but *temporary* positions is grossly insufficient. In other words, the really efficient technical and managerial executives, at present employed in private or semi-private enterprise, simply cannot afford to take positions of equal or greater responsibility in State-managed concerns. Some may declare that their patriotism is at fault in this connection; but in nearly every instance, with chemists at any rate, the so-called "private" employment is just as directly useful to the war effort; and it is surely unreasonable to expect a man to dislocate his whole life if his country is to receive no benefit thereby. The result is that too often the misfits in ordinary industry find their way into responsible positions in Government-controlled industry, with the inevitable result. We attribute much of the blame for the lack of efficiency to the unintelligent handling of that admirable tool, the Central Register. The function of that Register is to get the right man for the job at a fair rate of pay; but when (to quote the classic instance once again) the president of a noted scientific institution is offered a job at £3 a week, it is obvious that this function is not being fulfilled. Even in war time, some sort of ratio should be observed between responsibility and remuneration; and until this principle is observed management difficulties will continue to manifest themselves.

Munition Plant on the Grand Scale

MUNITION plants for the United States Army are springing up all over the country. A lead azide plant is to be added to Du Pont's TNT-DNT factory at Wilmington (Illinois), and a new ammonium nitrate works, of which the contractor has not yet been specified, is going up at Baxter Springs (Kansas). Further new plants in Louisiana and Missouri will bring the government-financed ammonia output to 1000 tons a day. Picric acid is the main product to be manufactured at Marche (Arkansas) by a specially formed organisation called the Cities Service Defence Corporation. Nitrotoluenes are additional products added to the output of the smokeless powder works at Childersburg (Alabama), and shell-loading plants are going into operation in many States. We are informed that the Iowa Ordnance Plant, at Burlington (Iowa) is one of the largest shell-loading plants in the world. Operated by Day and Zimmerman, Inc., of Philadelphia, it will cost $30,000,000, and will employ 7000 workers. Special safety precautions incorporated in the 500 buildings (which occupy a site of 20,000 acres) include floors of smooth waxed concrete that cannot collect dust particles, vibration-proof conveyors, and roofs and outer walls of light corrugated asbestos. Electric light fixtures throughout the plant are of a special design for the rapid diffusion of heat. Around all this is a 25-mile wire fence, seven feet high!

Contents of Cylindrical Tanks

SEVERAL charts have been developed for the determination of the contents of cylindrical tanks lying in a horizontal position, but a simple formula has now been evolved for more accurately computing contents without the use of charts. The new formula, quoted in the *American Gas Journal*, has been based on the excellent formula for areas of segments of circles given by Professor John Goodman in his "Mechanics Applied to Engineering." The chief objection to Professor Goodman's original formula is that it involves two different chords and does not include the diameter at all. The new formula is, therefore, based on a modification of Goodman's, reducing it to two factors—the diameter of the circle and the height of the segment. As a result the following formula for horizontal cylindrical tanks is offered:—

$$G = .0023hL\ (1.5\ \sqrt{Dh - h^2} + \sqrt{Dh})$$

Where

G = Number of gallons of liquid in the tank;
h = Height of the liquid in inches;
L = Inside length of tank in inches;
D = Inside diameter of tank in inches.

This formula is not applicable when the tank is more than half full, in which case the following must be substituted:—$G = L\ [.0034D^2 - .0023\ (D-h)\{1.5\ \sqrt{h\ (D-h)} + \sqrt{D\ (D-h)}\}]$.

Modern *p*H Measurement Technique

Superiority and Limitations of the Glass Electrode

by G. S. RANSHAW

SOME years ago the subject of *p*H measurement was attributed, by a majority of industrial technicians who ought to have known better, to the "passing fancy" of a small group of physical chemists. To-day it is taken seriously even by quite small concerns, the responsible employees of which endeavour to learn more about it and to profit by its applications to their own businesses. This has largely been due to two things, first, perfection of the glass electrode, and second, the pioneer work of a few firms who have devoted their energies towards producing instruments for *p*H measurement which are simple to operate, reliable, and relatively cheap. This has resulted in instruments of unquestioned reliability, worked either from batteries or the mains, which can give readings as accurate as ±0.02 of a degree in the hands of a comparatively unskilled operator. It has also resulted in more complex installations which record and control and which can be applied to the most diverse tasks in many industries, such as chemical manufacture, papermaking, textiles, food industries, leather production, and so on.

For reasons which need not be amplified beyond the statements that each of the well-known firms concerned issues full and instructive literature about its own products, and that to draw comparisons here might be open to misinterpretation, it is proposed to devote the present article to the first of the factors mentioned as having been partly responsible for the great progress made in the design of cheap, reliable, simply-operated *p*H meters, namely, the modern design of glass electrodes.

It is unnecessary to go deeply into the elementary properties of the glass electrode beyond stating, as a preliminary, that in aqueous solutions between *p*H 2 and *p*H 9 the glass electrode behaves strictly as the perfect hydrogen electrode, but "serious abnormalities occur in the region of negative *p*H and in that portion of the scale representing strongly alkaline solutions." The application of thermodynamics gives a perfectly clear explanation of the theory of the glass electrode in the neutral range of solutions, where it behaves as a normal hydrogen electrode. Imagine, for instance, two hydrochloric acid solutions of different concentrations, in which two hydrogen electrodes are immersed. For every faraday of current flowing through the cell, one equivalent of hydrogen ions

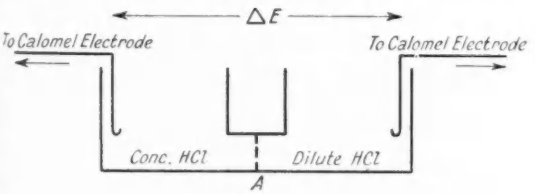


Fig. 2

is reversibly transferred from the concentrated to the more dilute solution. Neglecting liquid junction potentials, the E.M.F. is a measure of the free energy of transfer and is equal to the difference in the free energy of the hydrions in the two solutions.

Now consider the analogous glass electrode system, with the glass electrode at A (Fig. 2). For every faraday of current flowing through the glass electrode, one equivalent of hydrions is again reversibly transferred from the concentrated to the more dilute solution. The mechanism of this transfer is, however, quite different from that in the hydrogen electrode (Fig. 3), but the nett result is the same in both cases. The change in free energy is exactly the same, and therefore the E.M.F. of the glass electrode system must be exactly the same as that of the hydrogen

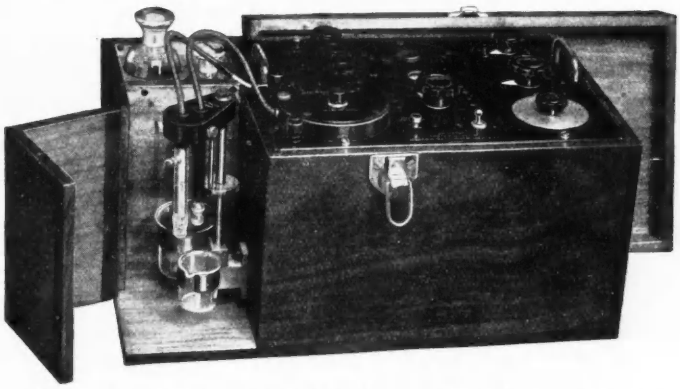


Fig. 1. A compact and portable *p*H meter of modern design—the Marconi-Ekco battery-operated meter, type 511 B, with a dip-type glass assembly electrode. It operates within an accuracy of ± 0.02 *p*H and 0.2 m/v within the temperature range 10°-40° C. Battery variations are nullified and do not affect the accuracy of the indication

electrode system. (The manner in which the transfer is carried out has no thermodynamic significance, except that it is concerned solely with the energy difference between the initial and final states of the system).

The equation for the E.M.F. across the glass membrane may be derived thermodynamically from the Gibbs-Donnan semi-permeable membrane equation by assuming that the glass is permeable only to hydrogen ions; from any liquid junction potential equation by assuming the mobility of the negative ion equal to zero, and, from phase boundary equations by assuming that the hydrion concentration in the glass remains constant. These three assumptions are physically equivalent. The equation obtained is the same as that of the hydrogen electrode (with the opposite sign):—

$$E = \frac{RT}{F} \log \frac{C_1H^+ . f_1H^+}{C_2H^+ . f_2H^+}$$

where C and f represent concentrations and activity coefficients expressed in terms of molecules per litre.

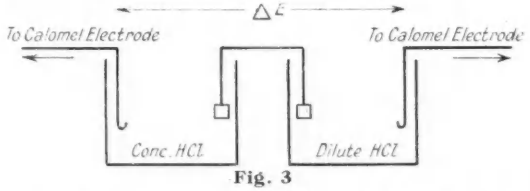


Fig. 3

Comparison of the mechanism of the hydrogen and glass electrodes respectively is interesting. In the hydrogen electrode, hydrogen ions capture electrons, or neutral hydrogen atoms lose electrons, as the current flows; in the case of the glass electrode, however, it is believed that the hydrion passes through the glass as an ion, and never *gains* an electron to become neutral hydrogen. Therefore the glass electrode potential remains uninfluenced by oxidation-reduction potentials in the solution, although the platinum surface of the hydrogen electrode is affected by the electron transfer of an oxidation-reduction reaction.

The latter cannot, then, be used to measure pH in the presence of an oxidation-reduction system.

The assumption that only hydrions migrate through the glass as the current flows has been justified experimentally as follows; the theory, however, is valid only for aqueous solutions between the pH values 0 and 9 and does not explain the fact that in very acid solutions the glass electrode gives negative deviations from the theoretical hydrogen electrode equation. These negative errors seemed to be independent of the presence and concentration of any particular ion, but did depend on a change in the concentration of the water. Dole has deduced the following expression for the error of the glass in acid and non-aqueous solutions:—

$$\Delta E = \frac{RT}{F} \log \frac{C_1H_2O \cdot f_1H_2O}{C_2H_2O \cdot f_2H_2O}$$

The derivation of this expression depends on the assumption that the hydrogen ion migrates through the glass as a hydrogen ion with one molecule of water of hydration, viz., $H+H_2O$. From Fig. 2 it is obvious that if the product $CH_2O.fH_2O$ is the same on both sides of the membrane there will be no free energy change of the water as it is transported from one solution to the other, but if the activity coefficient is reduced by the addition of concentrated acid, a large amount of salt, or alcohol, there will be a free energy change of the water as the current flows. This free energy change should appear as an E.M.F. Therefore if water is carried through the glass, from thermodynamic considerations the glass electrode will not have the same E.M.F. as a hydrogen electrode.

The glass used in the manufacture of glass electrodes contains water, for, if the glass is dried out, the resistance increases considerably. When the glass is immersed in a non-aqueous solution, hydrogen ions migrating out of the glass may carry water with them and hydrogen ions passing into the glass may carry neutral molecules also. Therefore the glass electrode gives unstable potentials in non-aqueous solutions and should not be used for the pH measurement of such.

A precise mathematical treatment of the behaviour of the glass electrode in alkaline solutions has not yet been fully developed, but it is not difficult to understand why the glass electrode here gives errors in the high pH range. In such solutions there are few hydrogen ions to carry the current across the glass-aqueous solution boundary. Thus it is probable that the other positive ions, which are present in concentrations 10^9 or more times as great as the hydrion, carry some of the current across the boundary. If this is the case then the E.M.F. measures the free energy transfer of other ions in addition to the hydrion and the glass electrode fails to be an electrode strictly reversible to the hydrogen ion. As is known, however, the errors are reproducible and empirical corrections may be applied.

Alternative practical electrodes need only be compared with the modern hydrogen electrode to demonstrate at once its superiority. The colorimetric method has the disadvantage that it is not applicable to coloured solutions; it is also inaccurate with systems containing colloids and suspended materials. Furthermore, it is subject to salt errors and to errors due to the presence of oxidising and reducing agents. The quinhydrone electrode is reasonably accurate over a portion of the pH range, but is useless above pH 8.5, being also seriously affected by oxidising and reducing agents in solution. It is subject to salt error, is adversely affected by certain "poisons," and results are not altogether reliable in buffered solutions. The hydrogen electrode is readily "poisoned" by oxygen and by many commercial products, besides being too inconvenient for general use. Metal-metal oxide combinations, such as the antimony electrode, are, according to the author's experience, inaccurate and subject to errors due to movement of solution, oxygen concentration, "poisoning," etc., although at least one firm claims to incorporate the antimony electrode reliably in its instruments for pH measurement and control.

In the past, the difficulty with regard to the glass electrode was its fragility and high resistance. Both these disadvantages have been eliminated as a result of progress in electronic measuring technique, which has made it possible to effect a very reasonable compromise between electrical resistance and mechanical strength.

Linings for Containers

A Safe and Economical Material

"PILSENITE" lining materials have been used for many years on the Continent for lining casks, vats, tanks, and other vessels in almost every industry. They were first manufactured in Pilsen, Czechoslovakia, but to-day Messrs. Parisek, Ltd., of Ludgate House, 107-111 Fleet Street, E.C.4, have opened a refinery in South Wales. There are various grades of the linings which can be applied to timber, metal, concrete, and slate (to avoid scaling) at temperatures up to 82° C. They will withstand indefinitely the action of brine, alkalies (caustic soda, potash, sulphide of soda, etc.) and acids (hydrochloric, sulphuric, acetic, etc.), even in fairly high concentrations.

Of the different grades, Pilsenite "RTL" and "HXC" may be used as a lining for the inner surfaces of containers, providing a protective layer, which is elastic, yet possesses a hard and glossy surface that will resist mechanical or chemical attack and prevent decay. The "LK" grade stops leaks and repairs fractures even in the enamel of glass-lined tanks, and it can be used as putty, particularly where resistance to corrosive atmospheres is required.

There are no solvents in Pilsenite linings; this not only gives added safety, but also ensures the economical use of the entire weight of material supplied. Pilsenite is applied to metal by the momentary application of a gas or paraffin blow lamp simultaneously warming the Pilsenite and the surface to be covered; for any other kind of material the Pilsenite is melted and brushed on to the clean, dry and slightly warmed surface. Any irregularities can be smoothed out by warming with a blow lamp or the heat of an electric radiator.

Chemical Plant Symbols

B.S. Method for Use on Diagrams

THE British Standards Institution has recently published British Standard No. 974, "Symbols for Use on Diagrams of Chemical Plant." In October, 1938, the Chemical Engineering Industry Committee appointed a small exploratory committee consisting of representatives of the Institution of Chemical Engineers, Society of Chemical Industry, British Chemical Plant Manufacturers' Association, and Association of British Chemical Manufacturers, to review proposals which had been received from the International Standards Association for the adoption of symbols for chemical plant and to consider whether it would be of advantage to industry to issue British Standard Symbols to be used in diagrams relating to such plant. The committee reported unanimously in favour of such a set of symbols, and as a result, the Chemical Engineering Industry Committee appointed a representative committee for this purpose.

This committee has taken into consideration all the symbols submitted by the International Standards Association, the various British Standard Symbols already in existence, and symbols in use by various industrial organisations. Wherever these were considered suitable they have been adopted or, after due consideration, appropriately modified. In their selection the committee proceeded on the principle that, in order to keep the number of basic symbols to a minimum quantity, only those symbols most necessary should be adopted, and that they should, as far as possible, be sufficiently pictorial to enable the units of plant represented by them to be readily recognised. The committee has endeavoured to avoid the use of any symbol which might be identified with a proprietary article.

Development of Plastics from Coffee

Economic Plant in Operation in Brazil

SINCE the reference we made in our issue for April 5 to the use of the surplus coffee of Brazil in the manufacture of the plastic "Caffelite," more light has been shed upon the subject. An article by C. E. Nabuco de Araujo, junr., and Herbert S. Polin in the A.C.S. *News Edition* (1941, 19, *16*, pp. 877-881) contains a review of the entire development of the process. The importance to Brazil of utilising her enormous surplus of coffee is immediately apparent when it is considered that from 1921 to 1938 there was an average surplus of 5,500,000 bags making a total of 1,000,000,000 lb. In 1931 the destruction of coffee was begun and in 1940 the number of bags destroyed was 70,000,000. To utilise these huge amounts of coffee, the H. S. Polin Laboratories, Inc., New York, sought a product which would use as much as possible of the bean, have a wide outlet, be produced cheaply, and find a ready market in Brazil and other South American countries. The investigations, undertaken originally on the initiative of the Polin Laboratories some three years ago, are being continued by these laboratories under the auspices of the National Coffee Department of the Brazilian Government. A study of the available coffee chemistry showed a wide variety of substances to be present, including caffeine and a fairly typical oil. With the possible exception of these two, no market existed for the bean constituents. Cost considerations threw doubt on the economic feasibility of extracting any of these materials. This arises from the restriction of investigative interest to the beverage aspect of coffee alone. In all the efforts to use the coffee industrially, until the advent of the present plan, consideration was given only to separating out and using the better known chemical constituents of the bean such as the oils, caffeine, and tannins. The chief virtue of the Caffelite plan is that it provides for use of the bean, cherry, or even the tree. The products separated out are true by-products of the process, and the cost of handling the whole coffee is not applied to them alone. Furthermore, extraction processes would still leave a considerable percentage of the bean unused. It was decided that the bean and plant would have to be processed in so far as possible as a unit, and further study indicated the possibility of producing a plastic material. Research was started which, in about a year, yielded a satisfactory, cheap moulding power, known as Caffelite.

Method of Production

The process for producing this plastic may be interpreted in the light of the chemical composition. It may be varied somewhat widely by modifying the physical factors as well as the individual chemical entities to give products suitable for a range of applications. The basic process involves comminuting the bean and putting the resulting meal through a solvent operation to remove the oil and caffeine. These are separated, and other materials carried over in the extraction are returned to the oil-free meal. The meal is mixed with water and usually an acid catalyst, and autoclaved at a temperature of about 150° C. It is then washed, neutralised, and dried under vacuum. The material produced is a thermosetting powder. After the addition of mould lubricants, dyes, or other desired modifiers, the powder is ready to be moulded. The reactions in the autoclave probably include hydrolysis of hemicelluloses and lower polysaccharides, involving production of furfural from the pentosans, condensation of the furfural with the polyhydric tannins, and combination of the aldehyde with the protein. This is undoubtedly a much simplified picture of the complex hydrolyses and interactions that occur but are difficult to determine. The washing removes the major portion of any acid catalyst and other water-soluble materials, including the degraded carbohydrates. The result is a cellulosic base on which has been deposited a complex of resinous materials. A further modification provides for fractionation of the coffee oil and introduction of selected fractions, or modified selected fractions, into the meal before the autoclaving stage. The coffee oil is fractionated to remove waxes which may interfere with the perfect wetting of the cellulosic base by the reactive products. Thus the oleic, linoleic, or other reactive fractions may be returned to the meal to function as a part of the resinous complex arising from the operation of the process.

This material is moulded at about 177° C., and the heat treatment produces further polymerisation reactions. The course of the reaction is indicated by the gradual conversion, as the cure progresses, from a poorly water-resistant, weak material to one that is tough and highly resistant to water, all solvents, and most acids and alkalies. The moulded material is highly resistant to heat, can be ignited but will not support a flame, and has excellent electrical properties. The material may be moulded either by extrusion or by pressure. It has a high degree of compatibility with other moulding compounds. Properties of the end product can be changed by variations, in the first place, of the autoclave process. The temperature and duration of the reaction can be varied, alone or in combination with controlled distillation, to accentuate one or another of the physical properties of the moulding powder or to give products suitable for other than moulding purposes.

A Simple Process

The above operations involve little change in production costs. None of the procedures require more than a small percentage of raw materials other than coffee. The objective during the research on Caffelite was development of a process which would not involve complicated operations or other reagents than those in the coffee plant itself, thus making a useful product at a minimum cost. The other method of changing the end product is to add to the reacting mass, resin-forming compounds such as amines or phenols. These processes have been fully investigated in the laboratory, but their commercial use is a matter of future demand.

Possibilities for the modification of the basic Caffelite moulding powder are great, when the composition of the coffee plant is considered. For instance, the reactive element may be withdrawn from the bean, modified, and reintroduced into the cellulose residuum, or the modification can be effected in the bean itself. The oil offers a ready source of glycerol and fatty acids, and pentosans, in which the husk is particularly rich, yield furfural. All these substances are starting points for various types of polymers, and work has been successfully prosecuted on the isolation and plasticising of the coffee protein and tannins. The addition of these materials in differing percentages, either during or after production of the basic compound, permits the formulation of a wide variety of Caffelite products.

A five-story, semi-commercial plant for producing Caffelite, caffeine, and coffee oil, has been completed at Sao Paulo, Brazil. The plant will handle 1000 lb. of coffee per hour. Grinders on the upper floor, are fed by gravity into storage hoppers and thence into a solvent extractor on the first floor. The solvent-free extracted meal is fed from storage hoppers into a steam-jacketed autoclave after mixture with water, catalyst, etc. The reacted meal is emptied into a blow-down tank, washed, neutralised, and vacuum-dried. Thence it passes into a blender for admixture of mould lubricant, etc., and comes out as the end product. As far as possible all flow is by gravity of pressure of the process equipment. Separate units isolate the oil and caffeine, and full equipment is provided for solvent recovery. Heating is by high-pressure steam produced in the plant. In this small plant there is complete provision for applying on factory scale all modifications of the process which laboratory work may develop.

The contemplated uses of Caffelite besides those of a

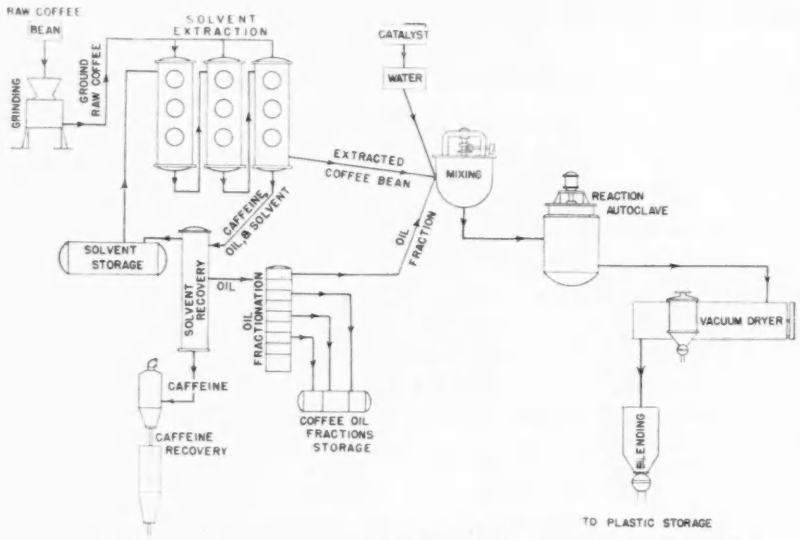
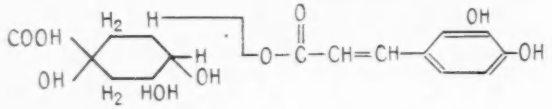


Fig. 1. Flow sheet illustrating the preparation of Caffelite from coffee

moulding powder include the manufacture of tile and wallboard. The oil has obvious outlets in the production of fatty acids and glycerol and as a substitute for such oils as palm oil. The oil also contains several of the vitamin compounds, and the germ oil is relatively rich in tocopherol. Caffeine is in particular demand at the present time as a result of war conditions, and finds wide use in the beverage and pharmaceutical fields. As indicated previously, the Polin Research Laboratories in New York and Rio de Janeiro contemplate an intensive utilisation of the coffee plant constituents. A number of materials with industrial possibilities have been developed. The coffee tannins, for instance, include a compound called chlorogenic acid, $C_{16}H_{18}O_9$, which has been given the structure of Fig. 2, and so is a depside of quinic and caffeic acids.



Quinic Acid Part *Caffeic Acid Part*

Fig. 2

It has been estimated to be present to the extent of from 1 to 6 per cent. Many methods have been proposed for the quantitative determination of chlorogenic acid. Difficulties in its separation have been largely overcome in the present research. It may be mentioned, for instance, that the compound can be hydrolysed into its constituent acids and the caffeic acid made to yield dihydroxystyrene. There is present an alkaloid, trigonelline, $C_7H_7NO_2$, which is the betaine of pyridine-β-carboxylic acid. Hydrochloric acid and heat convert it to nicotinic acid. Again, the unsaponifiable fraction of the oil is of considerable interest. While hardly any of the individual constituents have previously been isolated, various fractions will yield useful products. Among these are a powerful antioxidant, a pectin-like material, and a fraction which can be processed to yield an emulsifier of unusual stability. Antirachitic properties have been reported for the oil.

A full-size factory to process 5,000,000 bags of coffee per year is to be erected this year. With the operation of these plants, the problem of the coffee surplus will have been largely solved, and a great loss converted into an asset. The resulting stabilisation of the coffee market will place Brazil's chief export once more on a satisfactory basis.

The folowing resins and processes for the preparation of resins can be developed from coffee products:

PROTEIN.

Protein-aldehyde.
Protein-benzoyl products.
As a modifier of other resins.

OIL

Oil as a whole.
Oil-rubber reacted with hypochlorous acid.
Oil-sulphur (factice) or oil-sulphur chloride or oil-sulphur-sulphur chloride.
Oil-sulphur-furfural (under investigation).
Pitch residue from distillation.
Fatty acids.
Polyesters from chlorohydroxy acids.
Copolymerised with phthalic anhyride and glycerol (glyptals).
Pitch residue from distillation.
Glycerol.
Phthalic anhydride-glycerol; glyptals.
Decompose to yield acrolein, which can be polymerised.

CARBOHYDRATES.

Cellulose.
Cellulose nitrate and acetate and cellulose ethers (ethyl cellulose, etc.).
Celiulose-phenol (under investigation).
Pentosans yield furfural which can be condensed.
Furfural-protein.
Furfural-aniline.
Furfural-phenol.
Furfural-ammonia reaction products.
Furfural-oil-sulphur (under investigation).
Furfural-sulphur.
Furfural (self-polymerised).
Furfural-ketones (*e.g.*, acetone).

CHLOROGENIC ACID AND TANNINS

Hydrolyse to quinic and caffeic acid.
Decompose the caffeic acid to dihydroxystyrene.
Make phenols from the acid and polymerise these with aldehydes.

LIGNIN.

Lignin-phenols.
Lignin-aniline.

Fire-Resistant Coatings

Added Plasticiser Promotes Flexibility

A FIRE-RESISTING composition for coating or impregnating textiles and other materials, described some time ago in B.P. 498,181, can be made by adding chlorinated rubber and a solvent for the chlorinated rubber to a mixture of white lead and boiled linseed oil. Such compositions, however, tend to harden with age, become brittle and crack, and the same patentees (British Insulated Cables, Ltd., of Prescot, Lancashire, F. J. Brislee and L. Macfarlane) now recommend the addition of chlorinated paraffin wax or chlorinated diphenyl as a plasticiser for the chlorinated rubber. With this addition, it is claimed in B.P. 509,069, fire-resisting compositions are obtained which dry rapidly when applied as coatings and retain their flexibility for a considerable time.

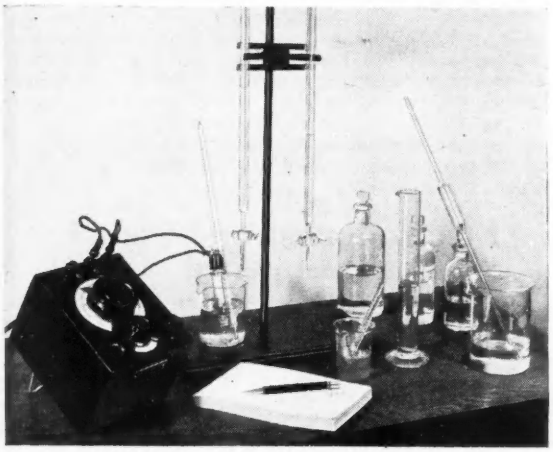
The proportions of the main ingredients are given as: 50-73 parts by weight of white lead, 3.5-11 p. boiled linseed oil, 3-10 p. chlorinated rubber, 2-10 p. chlorinated paraffin wax (or 3-13 p. chlorinated diphenyl) and sufficient solvent for the chlorinated rubber to produce a mixture of the required consistency. Thus several formulæ are given for compositions of a relatively thin consistency, suitable for coating textile materials, while other examples relate to less fluid preparations, recommended for direct application to rubber-covered cables. (*Paint Techn.*, 1941, *6*, 67, p. 165).

Conductivity Measurement

Accurate Apparatus for Industrial Processes

MEASUREMENT of the electrical conductivity of solutions, aways of great interest and importance in the laboratory, is now becoming increasingly essential in the factory as a method of maintaining rigid control over many widely differing industrial processes. In more and more industries, research work is showing that the conductivity of a solution is directly related to some other property of the liquid which is difficult, if not impossible, to assess quantitatively, and which may yet be the deciding factor in the quality of the final product.

The conductivity of a solution is determined by measuring the resistance of a column of liquid of known dimensions between two electrodes. The most accurate method of measuring this resistance uses a "balanced bridge" circuit derived from the original Wheatstone net, and the resistance of a solution is measured in the same way, with one important difference. When a direct current passes between two electrodes in a solution, electro-chemical



Mullard Conductivity-Measuring Apparatus

changes take place at the electrodes, causing a potential difference between the electrodes and the solution which opposes the passage of the current. This phenomenon, known as polarisation, makes it impossible to calculate the resistance of the liquid column from the potential drop across the cell and the current passing, since the potential drop measured at the electrodes is not the true potential drop across the ends of the column of liquid. However, these polarisation voltages require a finite time to build up, depending upon the resistance of the solution (the lower the resistance, the shorter the time required) and if the direction of the current is reversed before this time has elapsed, a true value will be obtained. This reversal is obtained automatically by using alternating current to supply the bridge.

Modern technical advances have overcome the well-known disadvantages of the old-fashioned type of bridge, which suffered either from lack of robustness or lack of sensitivity. The Mullard Wireless Service Co., Ltd., has developed a measuring bridge suitable for industrial use, which is both sensitive and robust, and is unaffected by mechanical shock or vibration. Should the terminals of the cell be accidentally short-circuited during use, no damage whatever will be caused to the instrument.

The complete apparatus comprises three units:

(1) MEASURING BRIDGE, TYPE GM. 4140, being a modified Wheatstone Bridge with built-in standards of resistance and capacity, containing its own power supply, amplifier, and balance indicator; the last being a "Magic Eye" electron beam tuning indicator, as used in radio receivers. This gives a "knife-edge" balance setting on all resistances from 0.1 ohm to 10 megohms.

(2) 1000-CYCLE OSCILLATOR, TYPE GM. 4260, for supplying an alternating voltage for the Wheatstone net circuit in order to avoid errors due to polarisation.

(3) CONDUCTIVITY CELL, TYPE GM. 4221, enabling accurate measurements to be made with only a few c.c. of liquid. Each cell is standardised against a solution of known conductivity and the cell constant is engraved on the cap. The solutions generally used for standardising the cells are $N/50$ or $N/100$ KCl. Solutions should be freshly made, as their conductivity will gradually increase as the result of absorption of conductive material from the glass. It is important that the temperature of the solution should be maintained constant at a known value, as the specific resistance will vary with temperature, the maximum permissible temperature variation being $\pm$ 0.2° C.

This apparatus makes it possible for factory operatives to achieve laboratory accuracy in the measurement of electrical conductivity under the most difficult conditions. It is easily portable and requires no elaborate precautions in setting-up. A good electrical earth connection and an alternating current supply of 100 to 250 volts are all that is required. A list of prices, full technical details, and a descriptive leaflet (MV. 916) are available post free from the makers, the Mullard Wireless Service Co., Ltd., Measuring Apparatus Section, Century House, Shaftesbury Avenue, London, W.C.2.

LETTER TO THE EDITOR

Service from "The Chemical Age"

SIR,—You will doubtless be pleased to know that we find your publication one of the most interesting and useful trade journals that we use in these Works. The writer is rather impressed with this fact because when he first suggested to our associated chemical expert that we considered taking THE CHEMICAL AGE, he was informed that whilst the paper would be interesting, it could not be of much service to us. This, of course, was not intended as a derogatory statement, but was based on the fact that our main interest is in the Light Metal Industry, but curiously enough we have proved that our friend's views were incorrect.

As a matter of fact we always turn to the advertisements first of all, and we have received great assistance from such advertisements as the Cellofas products of I.C.I., and various suppliers of, for example, metal drums. Another feature of interest to us is the Metallurgical Section, and we are always intensely interested in reading of the production of magnesium and magnesium alloys, particularly in cases where North America is mentioned.

As the finishing touch to the value we obtain from your publication, we would like to pay tribute to the ready service which you and your staff always give when any inquiries for assistance are referred to you over the telephone.—Yours faithfully,

for DURSTON, LANG & CO., LTD.,
G. HAROLD DURSTON,
Technical Director.

Harrow Weald, Middlesex.
October 7, 1941.

A CHEMIST'S BOOKSHELF

INTERMEDIATE CHEMICAL ANALYSIS. By A. J. E. Welch, Ph.D., A.R.C.S., D.I.C. London: University Tutorial Press. Pp. 128. 3s. 6d.

This is a useful manual for students entering for an Intermediate Examination of the Universities, for the Higher School Certificate, etc. It follows in plan, and replaces, Briggs and Bausor's well-known *Elementary Quantitative Analysis*. Special attention is wisely given to the need for entire accuracy in quantitative work, and to the care of instruments, an essential feature in the initiation of those approaching quantitative work for the first time. For the rest, the arrangement is logical and easily followed; and the inclusion of typical records of experiments, for the student to use as models in his note-book, is a feature that is too often omitted in works of this kind.

Personal Notes

MR. ROY POWELL, A.I.C., of Fazakerley, Liverpool, has become engaged to Miss Norah Catherine Higson.

MR. JAMES THOMSON, of Alexandria, Dumbartonshire, has retired after 70 years' service with the United Turkey Red Co., Ltd.

MR. T. BERRY, of Paisley, an assistant chemist in the Chemical Inspection Dept. of the Ministry of Supply, was among those elected to the membership of the Textile Institute at the September meeting of the Council.

MR. ANDREW SUTHERLAND, assistant station manager and chief chemist at the Provan Gas Works of Glasgow Corporation, has been appointed station manager at the Dalmarnock Gas Works, Glasgow.

DR. W. TAYLOR, D.Sc., F.I.C., senior lecturer in organic chemistry at the Regent Street Polytechnic, London, has been appointed head of the science department at the Municipal Technical College, Blackburn, in succession to Dr. F. Bell.

DR. E. W. SMITH, C.B.E. (released by the Woodall-Duckham Companies) has been appointed by the Board of Trade to be Director General of Gas Supply. He will have the assistance of Mr. J. F. Ronca, Mr. G. Evetts and Mr. P. Chantler.

Obituary

MR. ALEXANDER C. ROSS, who died in a Glasgow hospital on October 3, was a well-known member of the chemical trade in that city, having for many years served as chemist at the St. Rollox Works of the I.C.I.

MR. WILLIAM SCOTT, D.L., who died on October 6, aged 83, at Balfron, Stirlingshire, was managing director of the British Dyewood Co., Ltd., Sheitleston, until about 12 years ago when he retired. Mr. Scott was a member of the Glasgow Chamber of Commerce.

MR. WILLIAM HENRY DARGUE, who died at Gosforth, Northumberland, on October 4, aged 78, had devoted many years to acetylene research in its application to industry, and the company which bears his name, the Dargue Acetylene Gas Co., Ltd., is a large manufacturer of acetylene lamps. Mr. Dargue was a prominent member of the British Acetylene Association.

MR. GEORGE LAKE, formerly principal chemist with Olive and Partington, Ltd., paper makers, at Turn Lee Mills, Glossop, died at Mitchel Troy, Monmouthshire, on September 20, aged 86. He acted as personal adviser to Lord Doverdale, founder of the company, whom he accompanied on many continental trips, and he was one of the few surviving original members of the Society of Chemical Industry. He started his career at Wigan as a research worker in alkali, afterwards going to Manchester, where he did notable work in connection with the preparation and utilisation of sulphate spentwood liquors for tanning core and road binding.

Chemical Matters in Parliament

Liquidation of Zinc Company

IN the House of Commons last week Mr. Stokes asked the Parliamentary Secretary to the Ministry of Supply whether he was aware that Landore Zinc, Ltd., recently went into liquidation, owing the Ministry of Supply £1500, and what was the reason for his Ministry becoming a creditor of the company.

Replying in the affirmative to the first part of the question, Mr. Harold Macmillan pointed out that the firm was producing zinc by a special process, and the Ministry entered into contracts to secure the production on terms which it was considered would enable the company to continue its operations. The company was, however, unable to meet its liabilities and it went into voluntary liquidation. It appeared unlikely that the amount owing to the Ministry was as much as that stated.

New Control Orders

Basic Slag Prices

THE Control of Fertilisers (No. 15) Order, which came into force on October 1, provides uniform maximum prices for basic slag for the whole country. Stocks held by merchants at September 30 will, however, continue to be governed by the prices ruling on September 1. Copies of the Order (S.R. and O. 1941, No. 1494) may be obtained (price 1d.) from H.M. Stationery Office or through any bookseller.

Quicksilver Prices

The Control of Mercury (No. 7) Order, 1941, issued by the Minister of Supply, with effect from October 9, removes the price control from sales of quicksilver of 7 lb. and under. Sales of over 7 lb. will continue to be subject to the terms of the Control of Mercury (Nos. 5 and 6) Orders, 1941.

Export of Chemicals and Drugs

Under a Board of Trade Order signed on October 7 and coming into force on October 14, licences will be required to export to all destinations a number of additional chemicals, drugs and vitamins, including in some cases, their preparations. The existing prohibitions in respect of certain chemicals and drugs are extended to include their preparations. The Order, Export of Goods (Control) (No. 34) Order, 1941 (S.R. and O. 1941, No. 1559) also prohibits the exportation of a number of other chemicals and drugs to certain specified destinations.

Electrodepositors' Centre Re-opened

Activities Restarted in Birmingham

THE Midlands Centre of the Electrodepositors' Technical Society, which had suspended activities during the whole of the past year, met again in Birmingham on September 16 for its opening meeting of the forthcoming session. While the London section of the Society has functioned without interruption throughout the war, holding meetings at headquarters, the Northampton Polytechnic, it was deemed wisest to suspend activities in the Midlands until the present occasion.

At the opening of the meeting, Mr. E. J. Dobbs, B.Sc., announced that Dr. S. Wernick, hon. secretary of the Society, had been unanimously elected chairman of the Midlands Centre to carry on the work for the forthcoming session; Mr. E. A. Ollard, a past president, was elected vice-chairman; Mr. H. F. J. Stokes was re-elected hon. treasurer and Mr. H J. Bache was re-elected hon. secretary. Dr. Wernick, in his opening remarks, stressed the importance of interchanging technical information to electrodepositors who were confronted with problems of similar character in their war effort. He stated that it was hoped to hold meetings from time to time with this object in view and that arrangements for such meetings would entirely depend on the conditions existing at the time. Dr. Wernick then called on Mr. H. Riley to open a discussion on "Problems Confronting Electroplaters During War Time." Mr. A. E. Ollard, Mr. H. Silman, Mr. L. Wright, and Mr. Baier were among those who contributed to the discussion, at the conclusion of which a vote of thanks was passed to Mr. Riley for the very able way in which he had opened the proceedings.

Several technical catalogues on diffusion high-vacuum pumps operating with oil and mercury have just been produced by W. EDWARDS & CO. (LONDON), LTD., Southwell Road, S.E.5. The pumps are of considerable importance to manufacturers of many intricate devices connected with the war effort, and they should not be confused with pumps of the general engineering class. Only a small number of these catalogues have been printed, but copies will be gladly sent to genuinely interested applicants.

General News

Through the Control of Factory and Storage Premises and the Central Price Regulation Committee the Board of Trade will, in future, exercise a general control over warehouse rates and charges other than those of statutory bodies.

In a lecture given in the Royal Technical College, Glasgow, on October 3 to members of the Glasgow section of the Society of Chemical Industry, Mr. Noel Deerr traced the principal landmarks in the development of the sugar industry.

The Individualist Bookshop has now issued the seventh number in the series of pamphlets entitled "Post-war Questions." The latest production is "The Socialists' 'New Order,'" by Professor F. J. C. Hearnshaw.

In a written reply to Mr. Ness Edwards in the House of Commons last week, Mr. Assheton stated, on behalf of the Minister of Labour, that no instruction had been issued to Employment Exchanges prohibiting the submission of men over 65 years old for employment in Royal Ordnance factories.

A case containing half-a-dozen bottles of spirits of salts fell on the pavement at lunch time, last Tuesday, in the Strand, from a lorry belonging to F. W. Berk and Co., Ltd. The lorry was loaded with carboys; one of the bottles broke. The mishap, of an unusual type in the London streets, was watched by an interested crowd.

The following elections to Fellowship have been made by the Board of the Institute of Physics: H. Lipson, D.Sc.; G. W. Scott-Blair, M.A., Ph.D., A.I.C.; W. Sucksmith, D.Sc., F.R.S.; W. Weir, M.A.; R. V. Whelpton, M.Sc.; A. J. C. Wilson, M.Sc., Ph.D.; C. W. Wilson, M.Sc., Ph.D. In addition, 29 Associates were elected and 38 Subscribers and 10 Students admitted.

Arrangements have been made by the Ministry of Supply to import supplies of rosin, turpentine, and pine oil, which will be made available to actual users for approved purposes. The Ministry has appointed the United Kingdom Naval Stores Association, Ltd. (*see* p. 204), 106 Fenchurch Street, E.C.3, as distributive agents. Members of the association will notify users when stocks are available.

The Liverpool city analyst, Professor W. H. Roberts, who recently examined an "egg substitute" powder, sold by Thomas Scott and Sons (Bakers), Ltd., of Knowsley Road, Bootle, pronounced it to consist of flour, bicarbonate of soda, a little acid, and colouring matter, and to contain no eggs at all. The company was fined £5 with costs at Liverpool on Tuesday for selling an egg substitute powder bearing a label calculated to deceive. It was alleged that the powder was sold at 1600 per cent. above cost.

The London Section of the Society of Chemical Industry held the first meeting of the new session last Monday in the rooms of the Chemical Society, Burlington House, Piccadilly, when a discussion on "Water Softening" took place. It was introduced by Dr. A. Parker, who was followed by Mr. R. P. Donnelly, Mr. F. Courtney Harwood, Mr. G. W. Hewson, and Mr. E. L. Streatfield. On Wednesday the Society held a joint meeting with the Food Group, when Dr. E. B. Hughes deliverer the Jubilee Memorial Lecture. It was entitled "Modern Concepts of Analysis—with particular reference to Food."

Among the additions contained in the Trading with the Enemy (Specified Persons) (Amendment) (No. 16) Order to the list of persons and firms with whom trading is illegal, those of chemical interest include: Laboratorio Vitex, Ltda., B. Petropolis 85, Rio de Janeiro; Chen Nih Chemical Supply Co., 31 Chaotung Road, Shanghai; Drogueria Bayer and Farmacia Higia, both of Tegucigalpa, Honduras; Canal Zone Pharmacy, 4 de Julio 3, Panama City; "Farmacia la Catedral," Scasife Hnos., S.A., Palma 10, Asuncion, Paraguay; "Normal" Farmacia Zelaya y Cia., 1a Avenida Sur and 4a Calle Poniente, San Salvador; S.A. pour l'Industrie de l'Aluminium, Av. d'Ouchy, Lausanne, and Mineral and Metal A.G. (Mineral and Metal S.A.), Bahnhofplatz 225, Chur, and Talstrasse 15, Zurich, Switzerland; and "Urania" Comp. Anon. de Instrumentos Cientificos, Camejo a Pajaritos 5, Caracas, Venezuela.

From Week to Week

Foreign News

Large scale production of ammonium thiocyanate is now under way at the plant of the Eastern Gas and Fuel Associates, Everette, Mass., U.S.A. This large plant is built to produce both crystals and 30 per cent. liquor. The grade of crystals now under production has a purity in excess of 95 per cent.

Marina di Catanzaro, which suffered from a low-level daylight raid by bombers of the R.A.F. on Friday last week, is one of the few important railway junctions in the "toe" of Italy. It also possesses the important oil refinery of the S.A. Gaslini (of Genoa), engaged in the extraction of olive oil by the CS_2 process, and the processing of olive waste products for soap, feeding-stuffs, etc.

The Arvida plant of the Aluminum Co. of Canada, with 1500 pots in continuous operation, are understood to be producing about 1,000,000 lb. of aluminium daily. The present annual output is expected to be increased to about 500,000,000 lb. by the end of the current year. To fulfil extensive U.S. Government orders, enlargement of the Arvida and Shawinigan Falls plants are to be undertaken.

The Turco-German chrome negotiations have entered a further phrase. In reply to a German demand for delivery of chrome ore in 1943-44, the Turks replied that they would supply 100,000 tons in each of those years, provided that war material of the value of £T18,000,000 was delivered by Germany before 1943, and that subsequent deliveries of chrome should be balanced by corresponding amounts of war material from Germany. Negotiations on these lines are proceeding as we go to press.

Forthcoming Events

The course of 12 Saturday lectures entitled "Recent Advances in Paint and Varnish Technology," which is being given at the College of Technology, Manchester, by the Manchester section of the **Oil and Colour Chemists' Association,** will continue throughout the **Saturdays in October** (starting at 2.30 p.m.). The lectures deal with drying oils, synthetic resins, pigments, and general paint technology, and are delivered by Messrs. C. W. A. Mundy, A.I.C., F. J. Siddle, Ph.D., G. A. Campbell, M.Sc., and E. J. Bond, B.Sc., F.I.C.

A meeting of the **Chemical Society (Leeds Section)** will be held on **October 13,** at 6.30 p.m., in the General Lecture Theatre, Leeds University, when a lecture entitled "Analysis of Molecular Structure by X-Ray Methods" will be delivered by J. Monteath Robertson, D.Sc.

"The Bonding of Rubber to Metal" is the title of a lecture which Dr. S. Buchan will deliver at a meeting of the London Section of the **Institution of the Rubber Industry,** to be held at Caxton Hall, Caxton Street, S.W.1, on **October 13,** at 6.30 p.m.

A meeting of the **Institute of Fuel** will be held in the Connaught Rooms, Great Queen Street, W.C.2, on **October 15,** at 2.30 p.m., when Lieut.-Col. Sir John Greenly, K.C.M.G., C.B.E., F.Inst.F., will instal Mr. W. M. Selvey, Wh.Sc., A.R.C.S., M.Inst.C.F., M.I.Mech.E., M.I.E.E., F.Inst.F., as President of the Institute for the coming year. After the installation, Mr. Selvey will give his presidential address entitled, "The Hundred Thousand: An Engineer's Philosophy." During the meeting the Melchett Medal for 1941 will be presented to Dr. Clarence A. Seyler, D.Sc., F.I.C., F.Inst.F., who will present the Melchett Lecture, entitled, "Recent Progress in Coal Petrology."

The following lectures will be delivered at Burlington House, at 2.30 p.m., under the auspices of the **Chemical Soicety,** on **October 16,** the eighth Hugo Müller lecture will be delivered by Professor I. M. Heilbron, D.S.O., D.Sc., F.R.S., who will speak on "Some Aspects of Algal Chemistry"; this will be followed, on **October 30,** by a lecture on the "Constitution of Plastics," by Dr. C. Redfarn (joint meeting with the Plastics Group, Society of Chemical Industry); and on **November 20,** Dr. W. T. Astbury, F.R.S., will talk on "X-Rays and the Stoichiochemistry of the Proteins."

Weekly Prices of British Chemical Products

THERE have been no important changes during the past week in the market for general chemicals, trading conditions remaining steady throughout with values displaying a firm undertone. As for some time past, the chief consuming industries are occupied with existing contract commitments and delivery specifications are reported to cover good volumes. New bookings have been moderate in volume and influenced to some extent by the scarcity of available supplies. Yellow prussiate and bichromate of potash are scarce and permanganate of potash is in strong request. In the soda products section hyposulphite of soda is firm, and in good request, and there is a steady call for bichromate, yellow prussiate and chlorate of soda, although offers of these items are on a restricted scale. In the market for coal tar products, prices display, if anything, a firmer tendency. Creosote oil, cresylic acid and naphthalene, and carbolic acid are items in strong request whilst a steady demand is maintained for the light distillates.

MANCHESTER.—Most classes of chemical products on the Manchester market during the past week have been called for steadily so far as contract commitments are concerned, and a fair amount of inquiry has been in circulation for the leading soda and potash compounds, and also for a wide range of miscellaneous chemicals. In most directions early delivery requirements are not easily met and prices are very firm in consequence. In the by-products market, the light classes, as well as crude tar, creosote oil, carbolic acid, and cresylic acid, are in brisk demand and in most sections producers are well sold.

GLASGOW.—There is a steady day-to-day business in the Scottish heavy chemical trade for the home market. Export business is still rather slow. Prices are very firm with a tendency to rise owing to a further increase on production costs. Prompt delivery is becoming more and more difficult.

Price Changes

Rises:—Alum, Aluminium Sulphate, Ammonium Sulphate, Arsenic, Bleaching Powder, Creosote, Cresylic Acid, Lead Nitrate, Naphtha, Oxalic Acid, Potassium Bichromate, Potassium Carbonate, Soda (Caustic), Sodium Bichromate, Sodium Nitrate.

Falls:—Rosin.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton £39 10s.; 10 cwt./1 ton, £40 10s., 4/10 cwt., £41 10s.; 80% pure, 1 ton, £41 10s.; 10 cwt./1 ton, £42 10s.; 4/10 cwt., £43 10s.; commercial glacial, 1 ton, £49; 10 cwt./1 ton, £50; 4/10 cwt., £51; delivered buyers' premises in returnable barrels, £4 10s. per ton extra if packed and delivered in glass.

Acetone.—Maximum prices per ton, 50 tons and over, £65; 10/50 tons, £65 10s.; 5/10 tons, £66; 1/5 tons, £66 10s.; single drums, £67 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alum.—Loose lump, £10 10s. per ton, d/d, nominal.

Aluminium Sulphate.—£10 15s. per ton d/d.

Ammonia Anhydrous.—1s. 7d. to 2s. 2d. per lb.

Ammonium Carbonate.—£32 to £39 per ton d/d in 5 cwt. casks.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £19 10s. per ton. See also Salammoniac.

Antimony Oxide.—£68 per ton.

Arsenic.—99/100%, £36 per ton, ex store.

Barium Chloride.—98/100%, prime white crystals, £11 10s. to £13 per ton, bag packing, ex works; imported material would be dearer.

Bleaching Powder.—Spot, 35/37%, £11 per ton in casks, special terms for contract.

Borax, Commercial.—Granulated, £26; crystals, £27; powdered, £27 10s.; extra fine powder, £28 10s.; B.P. crystals, £35; powdered, £35 10s.; extra fine, £36 10s. per ton for ton lots, in free 1-cwt. bags, carriage paid in Great Britain. Borax Glass, lump, £73; powder, £74 per ton in tin-lined cases for home trade only, packages free, carriage paid.

Boric Acid.—Commercial, granulated, £42 10s.; crystals, £43 10s.; powdered, £44 10s.; extra fine powder, £46 10s.; large flakes, £55; B.P. crystals, £51 10s.; powdered, £52 10s.; extra fine powdered, £54 10s. per ton for ton lots in free 1-cwt. bags, carriage paid in Great Britain.

Calcium Bisulphite.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £5 15s. per ton ex store.

Charcoal Lump.—£10 10s. to £14 per ton, ex wharf. Granulated, supplies scarce.

Chlorine, Liquid.—£21 7s. 6d. per ton, d/d in 16/17 cwt. drums (3-drum lots); 5½d. per lb. d/d station in single 70-lb. cylinders.

Chrometan.—Crystals, 5½d. per lb.; liquor, £24 10s. per ton d/d station in drums.

Chromic Acid.—1s. 2d. per lb., less 2½%; d/d U.K. GLASGOW: 1s. 0½d. per lb. for 1 cwt. lots.

Citric Acid.—1s. 2d. per lb. MANCHESTER: 1s. 6d.

Copper Sulphate.—About £29 10s. per ton f.o.b. MANCHESTER: £29 10s., less 2%, in 5 cwt. casks f.o.b. Liverpool.

Cream of Tartar.—100%, 262s. per cwt., less 2½%, d/d in sellers' returnable casks.

Formaldehyde.—£21 15s. to £25 per ton d/d. MANCHESTER: 40%, £22 to £25 per ton in casks d/d; imported material dearer.

Formic Acid.—85%, £47 per ton for ton lots, carriage paid; smaller parcels quoted up to 50s. per cwt., ex store.

Glycerine.—Chemically pure, double distilled 1260 s.g., in tins, £3 15s. to £4 15s. per cwt., according to quantity; in drums, £3 7s. 6d. to £4 1s. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 6s. 3½d. to 8s. 9½d. carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 6d. per lb.

Iodine.—Resublimed B.P., 9s. 11d. to 13s. 11d. per lb., according to quantity.

Lactic Acid.—Dark tech., 50% by vol., £37 10s. per ton; 80% by weight, £79; pale tech., 50% by vol. £44; 80% by weight, £86. Not less than one ton lots ex works; barrels returnable, carriage paid.

Lead Acetate.—White, £48 to £52 ton lots. MANCHESTER: £46 to £48 per ton.

Lead Nitrate.—About £46 10s. per ton d/d in casks.

Lead Red.—English, 5/10 cwt., £43 10s.; 1 cwt. to 1 ton, £43 5s.; 1/2 tons, £43; 2/5 tons, £42 10s.; 5/20 tons, £42; 20/100 tons, £41 10s.; over 100 tons, £41 per ton, less 2½ per cent., carriage paid; non-setting red lead 10s. per ton dearer in each case.

Lead White.—Dry English, less than 5 tons, £55; 5/15 tons, £51; 15/25 tons, £50 10s.; 25/50 tons, £50; 50/200 tons, £49 10s. per ton, less 5 per cent., carriage paid; Continental material, £1 per ton cheaper. Ground in oil, English, 1/5 cwt., £63 10s.; 5/10 cwt., £62 10s.; 10 cwt. to 1 ton, £62; 1/2 tons, £60 10s.; 2/5 tons, £59 10s.; 5/10 tons, £57 10s.; 10/15 tons, £56 10s.; 15/25 tons, £56; 25/50 tons, £55 10s.; 50/100 tons, £55 per ton, less 5 per cent., carriage paid.

Litharge.—1 to 2 tons, £43 per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £18 15s. to £22 15s. per ton.

Magnesium Chloride.—Solid (ex wharf), £12 to £13 per ton. MANCHESTER: £13 to £14 per ton.

Magnesium Sulphate.—Commercial, £10 to £12 per ton, according to quality, ex works.

Mercury Products.—Controlled price for 1 cwt. quantities: Bichloride powder, 11s. 7d.; bichloride lump, 12s. 2d.; ammon. chloride powder, 13s. 5d.; ammon. chloride lump, 14s.; mercurous chloride, 13s. 9d.; mercury oxide, red cryst., B.P., 15s.; red levig. B.P., 15s. 6d.; yellow levig. B.P., 14s. 9d.; yellow red, 14s. 4d.; sulphide, red, 12s. 11d.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 2s. 4d. per gal.; pyridinised 64° O.P. 100 gals., 2s. 5d. per gal.

Nitric Acid.—£23 to £31 per ton ex works.

Oxalic Acid.—£60 to £65 per ton for ton lots, carriage paid, in 5-cwt. casks; smaller parcels would be dearer; deliveries slow.

Paraffin Wax.—Nominal.

Potash, Caustic.—Basic price for 50-100 ton lots. Solid, 88/92%, commercial grade, £53 15s. per ton, c.i.f. U.K. port, duty paid. Broken, £5 extra; flake, £7 10s. extra; powder, £10 extra per ton. Ex store, £3 10s. supplement.

Potassium Bichromate.—Crystals and granular 8d. per lb.; ground 7½d. per lb., carriage paid.
Potassium Carbonate.—Basic prices for 50 to 100 ton lots; calcined, 98/100%, £58 per ton, c.i.f. U.K. port. Ex warehouse, £3 10s. extra per ton.
Potassium Chlorate.—Imported powder and crystals, ex store London, 2s. per lb.
Potassium Iodide.—B.P., 8s. 8d., to 12s. per lb., according to quantity.
Potassium Nitrate.—Small granular crystals, £40 to £45 per ton ex store, according to quantity.
Potassium Permanganate.—B.P., 1s. 8½d. per lb. for 1 cwt. lots; for 3 cwt. and upwards 1s. 8d. per lb.; technical, £7 15s. 3d. to £8 9s. 6d. per cwt., according to quantity d/d.
Potassium Prussiate.—Supplies scarce, prices nominal.
Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £19 10s. per ton, in casks, ex store.
Soda, Caustic.—Solid, 76/77%, spot, £15 7s. 6d. per ton d/d station.
Sodium Acetate.—£40 per ton, ex wharf.
Sodium Bicarbonate (refined).—Spot, £11 per ton, in bags.
Sodium Bichromate.—Crystals, cake and powder, 5½d. per lb., anhydrous, 6d. per lb., net d/d U.K.
Sodium Bisulphite Powder.—60/62%, £17 10s. per ton d/d in 2-ton lots for home trade.
Sodium Carbonate Monohydrate.—£21 per ton d/d in minimum ton lots in 2 cwt. free bags.
Sodium Chlorate.—£36 to £45 per ton, d/d, according to quantity.
Sodium Hyposulphite.—Pea crystals, £19 15s. per ton for 2-ton lots; commercial £14 15s. per ton. MANCHESTER: Commercial, £14 10s.; photographic, £19 15s.
Sodium Iodide.—B.P., for not less than 28 lb., 9s. 6d. per lb.; for not less than 7 lb., 13s. 1d. per lb.
Sodium Metasilicate.—£15 15s. per ton, d/d U.K. in cwt. bags.
Sodium Nitrate.—Refined, £14 10s. to £15 per ton for 2-ton lots d/d.
Sodium Nitrite.—£24 10s. per ton for ton lots.
Sodium Perborate.—10%, £5 2s. per cwt.
Sodium Phosphate.—Di-sodium, £17 per ton d/d for ton lots. Tri-sodium, £22 per ton d/d for ton lots.
Sodium Prussiate.—From 7½d. per lb. ex store.
Sodium Silicate.—£9 15s. per ton, for 4-ton lots.
Sodium Sulphate (Glauber Salts).—£4 10s. ton d/d.
Sodium Sulphate (Salt Cake).—Unground. Spot £4 8s. 6d. per ton d/d station in bulk. MANCHESTER: £4 13s. 6d. per ton d/d station.
Sodium Sulphide.—Solid 60/62%. Spot, £17 15s. per ton d/d in drums; crystals, 30/32%, £12 12s. per ton d/d in casks.
Sodium Sulphite.—Anhydrous, £29 10s. per ton; Pea crystals, spot, £18 10s. per ton d/d station in kegs; commercial, £12 15s. per ton d/d station in bags.
Sulphur.—Finely powdered, £19 per ton d/d; precip. B.P., 68s. per cwt.
Sulphuric Acid.—168° Tw., £6 10s. to £7 10s. per ton; 140° Tw., arsenic-free, £4 11s. per ton; 140° Tw., arsenious, £4 3s. 6d. per ton. Quotations naked at sellers' works.
Tartaric Acid.—3s. 1d. to 3s. 3½d. per lb., less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 3s. 3d. per lb.
Zinc Oxide.—Maximum prices: White seal, £30 17s. 6d. per ton; red seal, £28 7s. 6d. d/d; green seal, £29 17s. 6d. d/d buyers' premises.
Zinc Sulphate.—Tech., about £20, carriage paid, casks free.

Rubber Chemicals

Antimony Sulphide.—Golden, 1s 1½d. to 1s. 10d. per lb. Crimson, 1s. 10d. to 2s. 2d. per lb.
Arsenic Sulphide.—Yellow, 1s. 10d. to 2s. per lb.
Barytes.—Best white bleached, £8 3s. 6d. per ton.
Cadmium Sulphide.—5s. 9d. to 6s 5d. per lb.
Carbon Black.—5½d. to 8½d. per lb., according to packing.
Carbon Bisulphide.—£33 5s. to £38 5s. per ton, according to quantity, in free returnable drums.
Carbon Tetrachloride.—£46 to £49 per ton.
Chromium Oxide.—Green, 1s. 6d. per lb.
India-rubber Substitutes.—White, 5 15/16d. to 8¾d. per lb.; dark, 5 9/16d. to 6 3/16d. per lb.
Lithopone.—30%, £25 per ton; 60%, £31 to £32 per ton. Imported material would be dearer.
Mineral Black.—£10 to £14 per ton.
Mineral Rubber, "Rupron."—£20 per ton.
Sulphur Chloride.—7d. per lb.
Vegetable Lamp Black.—£45 per ton.
Vermilion.—Pale or deep, 13s. per lb., for 30-lb. lots. Plus 5% War Charge.

Nitrogen Fertilisers

Ammonium Phosphate Fertilisers.—Type B, £13 18s. 9d. per ton in 6-ton lots, d/d farmer's nearest station in September.
Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station; October delivery, £9 14s. 6d. Increase of 1s. 6d. per ton for every month up to £10 0s. 6d. in February, 1942; March/June, 1942, £10 2s. Rebate per ton on future deliveries, October, 10s.; November, 6s.; December, 2s.
Calcium Cyanamide.—Nominal; supplies very scanty.
Concentrated Complete Fertilisers.—£14 8s. 9d. per ton in 6-ton lots, d/d farmer's nearest station in September. Supplies small except C.C.F. Special.
"Nitro Chalk."—£9 14s. per ton in 6-ton lots, d°d farmer's nearest station in September.
Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £15 per ton; granulated, over 98%, £14 10s. per ton. Surcharges for smaller quantities unless collected at warehouse or depots.

Coal Tar Products

Benzol.—Industrial (containing less than 2% of toluol), 2s. to 2s. 2d. per gal., ex works.
Carbolic Acid.—Crystals, 9½d. to 10¾d. per lb.; Crude, 60's 3s. 3d. to 4s. 6d., according to specification. MANCHESTER: Crystals, 10½d. per lb., d/d; crude, 3s. 10d. to 4s. 1d., naked, at works.
Creosote.—Home trade, 5½d. to 7½d. per gal., f.o.r., maker's works; exports 6d. to 6½d. per gal., according to grade. MANCHESTER: 6½d. to 9d. per gal.
Cresylic Acid.—Pale, 99/100%, 4s. 3d. per gal. MANCHESTER: Pale, 99/100%, 4s. 9d. per gal.
Naphtha.—Solvent, 90/160°, 2s. 6d. to 2s. 10d. per gal.; Heavy 90/190°, 1s. 10½d., naked at works. MANCHESTER: 90/160°, 2s. 6d. to 2s. 10d.
Naphthalene.—Crude, whizzed or hot pressed, £14 per ton; purified crystals, £23 per ton in 2-cwt. bags; flaked, £27 per ton. Fire-lighter quality, £7 10s. to £9 10s. per ton ex works. MANCHESTER: Refined, £27 per ton.
Pitch.—Medium, soft, nominal, f.o.b. MANCHESTER: Nominal.
Pyridine.—90/140°, 18s. per gal.; 90/160°, 14s.; MANCHESTER: 14s. to 18s. 6d. per gal.
Toluol.—Pure, 2s. 5d. nominal; 90's 1s. 10d. per gal. MANCHESTER: Pure, 2s. 5d. per gal. naked.
Xylol.—Commercial, 3s. 6d. per gal.; pure, 3s. 10d. MANCHESTER: 3s. 4d. to 3s. 10d. per gal.

Wood Distillation Products

Calcium Acetate.—Brown, £21 per ton; grey, £24. MANCHESTER: Grey, £23.
Methyl Acetone.—40.50%, £54 per ton.
Wood Creosote.—Unrefined, 2s. per gal., according to boiling range.
Wood Naphtha, Miscible.—4s. 6d. to 5s. per gal.; solvent, 5s. per gal.
Wood Tar.—£4 to £5 per ton, according to quality.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.
o-**Cresol** 30/31° C.—Nominal.
p-**Cresol** 34/35° C.—Nominal.
Dichloraniline.—2s. 8½d. per lb.
Dinitrobenzene.—8½d. per lb.
Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.
p-**Nitraniline.**—2s. 5d. per lb.
Nitrobenzene.—Spot, 5½d. per lb., in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.
Nitronaphthalene.—1s. 2d. per lb.; P.G., 1s. 0½d. per lb.
o-**Toluidine.**—1s. per lb., in 8/10 cwt. drums, drums extra.
p-**Toluidine.**—2s. 2d. per lb., in casks.
m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—October 8.—For the period ending November 1 per ton, net, naked, ex mill, works or refinery, and subject to additional charges according to package and location of supplies:—LINSEED OIL, raw, £41 10s. RAPESEED OIL, crude, £44 5s. COTTONSEED OIL, crude, £31 2s. 6d.; washed, £34 5s.; refined edible, £35 12s. 6d.; refined deodorised, £36 10s. SOYA BEAN OIL, crude, £33; refined deodorised, £37. COCONUT OIL, crude, £28 2s. 6d.; refined deodorised, £31 7s. 6d. PALM KERNEL OIL, crude, £27 10s.; refined deodorised, £30 15s. PALM OIL, refined deodorised, £37; refined hardened deodorised, £41. GROUNDNUT OIL, crude, £35 10s.; refined deodorised, £40. WHALE OIL, crude hardened, 42 deg., £30 10s.; refined hardened, 42 deg., £33. ACID OILS.—Groundnut, £19; soya, £17; coconut and palm kernel, £22 10s. ROSIN, 26s. 6d. to 33s. per cwt., ex wharf, according to grade. TURPENTINE, spot, American, nominal.

LIVERPOOL.—October 7.—TURPENTINE, spot, American, nominal.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

TREFOREST CHEMICAL CO., LTD., London, E.C. (M., 11/10/41). September 15, £500 charge, to Cardiff Building Society; charged on land and messuage at Ynyslyn. *Nil. September 3, 1940.

Satisfaction

HIGH SPEED STEEL ALLOYS, LTD., Widnes. (M.S., 11/10/41.) Satisfaction, September 20, £165,000 "A" debenture stock, registered June 15, 1922.

Receivership

XELEX PRODUCTS, LTD., London, W. (R., 11/10/41.) Manufacturers and dealers in plastic material. R. C. Sheen, of Moorgate Hall, Moorgate, E.C., appointed Receiver on August 20 (by order of court).

Company News

John Thompson (Engineering) Co., Ltd., have announced an interim dividend of 5 per cent. (same).

International Bitumen Emulsions, Ltd., have declared a dividend of 4 per cent. (same) for year to March 31; profit for the year was £18,968 (£23,046).

Manganese Bronze and Brass Co., Ltd., have declared an interim ordinary dividend of 7½ per cent. for the year ended December 31. No interim was paid for 1940, but a first and final dividend of 25 per cent. was paid in respect of that year.

New Companies Registered

Cos Products, Ltd. (369,456).—Private company. Capital: £1000 in 1000 shares of £1 each. Manufacturers of and dealers in chemicals, disinfectants, fertilisers, etc. Registered office: 9 Arundel Street, London, W.C.2.

Dorena, Ltd. (369,678).—Private company. Capital: £100 in 100 shares of £1 each. Wholesale chemists, druggists, manufacturers of and dealers in pharmaceutical, medicinal, chemical, industrial and other preparations. Directors: Frank G. Corbett; Carl F. W. Ross. Registered office: Bedford Avenue, Trading Estate, Slough, Bucks.

Jem Alloys, Ltd. (369,582).—Private company. Capital: £1000 in 1000 shares of £1 each. Metallurgists, metal smelters, refiners, processors and fabricators, manufacturing and industrial chemists, and analysts, etc. Directors: John E. Moore, Thos. Mackie, Joseph E. Moore, Frank Fox, C.A., and Harry B. Connell. Solicitors: Wilfred Dunn and Connell, Parkinson's Chambers, Hustlergate, Bradford.

Anglo-Iranian Research, Ltd. (369,622).—Private company. Capital: £5000 in 5000 shares of £1 each. To acquire any interest in patents and inventions, to engage for itself or others in research, to manufacture and deal in petroleum and petroleum products and substitutes therefor. Subscribers: H. T. Kemp and T. Macdonald. Registered office: Britannic House, Finsbury Circus, E.C.2.

United Kingdom Naval Stores Association, Ltd. (369,448).—Association, limited by guarantee, without share capital. To co-operate with the appropriate authorities in connection with the allocation and distribution in the United Kingdom of certain products, to protect the interests of importers of such products, etc. Subscribers: C. Cran, 15 Queen's Gate Gardens, S.W.7, W. Prior, and 5 others. The first members of the Management Committee are:—F. O. Ashmore (Calico Printers' Association, Ltd.); N. E. Bollam (Fairclough, Dodd and Jones, Ltd.); T. H. Butler, Ph.D., J.P. (Wm. Butler and Co., Bristol, Ltd.); I. Danischewsky (White Sea and Baltic Co.); F. J. Dodd (F. J. Dodd and Co.); A. P. Jones (Bowring, Jones and Tidy, Ltd.); B. L. Morgan (Paper Makers' Chemicals, Ltd.); A. V. Pound, L. A. Quick (Langley-Smith and Co., Ltd.); J. H. Reeves (Goodlake and Nutter), and R. Speirs (Wm. N. Gemmill and Co., Ltd.).

C. D. Patents, Ltd. (369,624).—Private company. Capital: £520 in 520 shares of £1 each. To enter into an agreement between the British Coal Utilisation Research Association of the first part, C. U. R. A. Patents, Ltd., of the second part, Imperial Chemical Industries, Ltd., Powell Duffryn Associated Collieries, Ltd., Tilmanstone (Kent) Collieries, Ltd., and Thomas de la Rue, Ltd., of the third part, and this company of the fourth part, to acquire patents relating to the physical disaggregation or other treatment of coal, etc. Subscribers: J. E. James; R. A. Lynex. Solicitor: E. A. Bingen, Nobel House, Buckingham Gate, S.W.1.

Chemical and Allied Stocks and Shares

AWAITING further news as to the latest turn of war developments in Russia, business in the stock and share markets has shown little improvement. Nevertheless, owing to the absence of selling, there was again a tendency in many directions for prices to respond strongly to moderate demand. Moreover, sentiment was assisted by the further gains shown in British Funds, and also by the weight of money awaiting investment. Although, at the time of writing, best prices made in the past few days have not been fully held, numerous shares of companies associated with the chemical and allied industries were again better on balance, in accordance with the general market trend.

Imperial Chemical were 1s. higher at 33s., it being pointed out that, based on the 8 per cent. dividend rate, which is generally expected to be maintained, the yield still exceeds that obtainable on many other leading industrial shares. I.C.I. 7 per cent. preference at 33s. 3d. were also above the price ruling a week ago. Moreover, Lever and Unilever further improved to 27s. 3d. The yield on the latter is very moderate based on last year's 5 per cent. dividend, but, as in many other instances, the scope for recovery in dividends and earnings after the war is an important influence on market values. Triplex Glass 10s. ordinary, which have further improved to 27s. 6d., give a very small yield; but it is pointed out that although last year's 10 per cent. dividend absorbed a large part of the available net profits, the latter were struck on a very conservative basis, and that bearing in mind that the company has a satisfactory E.P.T. standard, there may be a reasonable possibility of further improvement in the dividend for the current year. Barry and Staines at 37s. was another share which moved above the price ruling a week ago, and Nairn and Greenwich were firm at 61s. 3d. Following the announcement of the lowering of the dividend rate to 4 per cent., Wall Paper Manufacturers deferred units moved back sharply, but later there was a partial rally to 25s. 6d. This is another instance where the scope for recovery in earnings in the post-war period is a more important factor governing the value of the shares than the immediate dividend yield. Elsewhere, Borax Consolidated deferred units moved better at 28s. 9d. and Fison Packard were again 35s., while B. Laporte were 62s. 6d., and remained firmly held. British Aluminium at 44s. 9d., and British Oxygen at 66s. 3d. were relatively steady features.

There was a better tendency among iron, steel and kindred issues, and Allied Ironfounders further improved to 20s. 9d. Moreover, added by market expectations that the dividend is likely to be maintained, Tube Investments were firm at 93s., and, in other directions, Stewarts and Lloyds were 47s. 4½d. Following their recent decline to 50s. on the reduced interim dividend, Associated Cement have shown a moderate rally to 51s. 10½d. at the time of writing. There was again a fair amount of activity in British Plaster Board 5s. shares, which continued to be quoted around 17s. Awaiting the company's interim statement, Pinchin Johnson were fairly steady around 23s. 9d., and, among other shares, International Paint remained firm at 92s. 6d. British Oil and Cake Mills preferred ordinary made the slightly higher price of 40s. 9d. Dunlop Rubber have been active around 37s. Murex were lower at 86s. 3d., but are now "ex" the recently-declared dividend, and movements in Turner and Newall and most other widely-held shares were small and unimportant.

The units of the Distillers Co. were little changed at 69s. 9d., but United Molasses 10s. ordinary shares were again higher at 28s. 6d. W. J. Bush ordinary, which are very firmly held and do not often change hands, continued to be quoted at 40s., while elsewhere Monsanto Chemicals 5½ per cent. preference shares were maintained at 22s. 6d., and Greeff-Chemicals 5s. ordinary were around par. Cellon 5s. ordinary were again quoted at 12s. 6d., and Boots Drug 5s. units made the higher price of 35s. Aided by the general market trend and the Burmah Oil interim dividend, oil shares moved higher on balance, although best prices made in the past few days were not held.